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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/807,394	04/12/2001	Henning Henningsen	GRP-0001	9224

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EXAMINER

LUK, EMMANUEL S

ART UNIT	PAPER NUMBER
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1722

DATE MAILED: 12/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/807,394

Applicant(s)

HENNINGSEN, HENNING

Examiner

Emmanuel S. Luk

Art Unit

1722

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, 5, 7, 8, 10, 11 and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Fudim in view of Berlin (5790297).

Fudim teaches the claimed apparatus and method having a rapid prototyping machine for manufacturing 3-D objects(19), the apparatus having at least one light source (18) for illumination of a cross section of the light-sensitive material (11) by at least on spatial light modulator of individually controllable light modulators (20), wherein the at least one light source is optically coupled to a plurality of light guides (13) arranged with respect to the spatial light modulator arrangement in such a manner that each light guide illuminates a sub-area of the cross section (Col. 4, lines 42-48). The spatial modulator arrangement comprises transmissive light valves, optical fibers (14) constitute the optical light guides (13), the individual light valves are arranged in rows in a transverse direction of a surface at a given mutual distance, the rows being mutually displaced in the transverse direction (Fig. 4), the exposure head (18) comprising a bar having relative movement by the drives (16, 21) over the illumination surface, the optical means for spreading the light beams over the illumination surface.

Fudim fails to teach at least two spatial light modulators of individually controllable light modulators.

Berlin teaches an array of light modulators (Col. 14, lines 10-15) that are individually controllable (Col. 14, lines 20-26) to compensate the failure of any one of the light modulators. The use of an array of light modulators allows for more power efficient operations than conventional scanning or projection devices (Col. 1, lines 18-23).

It would have been obvious to one of ordinary skill in the art to modify Fudim with an array of light modulators as taught by Berlin because it provides improved efficiency in operations.

3. Claims 3, 4, 6, 9, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fudim in view of Berlin, as applied to claims 1, 2, 5, 7, 8, 10, 11 and 15-17, and further in view of Hull (4,929,402).

Fudim teaches the claimed apparatus as shown above. Fudim fails to teach micro lens, a short arc gap lamp, control circuitry and electromechanical light valves.

Hull teaches a rapid prototyping apparatus having a light source (26) using a 350 watt mercury short arc lamp in a housing focused on the end of a 1 mm diameter UV transmitting fiber optic bundle (Col. 7, lines 44-49). The bundle having an electronically controlled shutter blade between the lamp and the end of the bundle, that can turn the light through the bundle on and off, the optical output is fitted into a lens tube that has a quartz lens to focus the UV to a spot (Col. 7, lines 50-55). Hull also teaches that a UV

laser is a better light source than a short arc lamp (Col. 5, lines 16-21) due to the intensity of the light source and the response of the UV curable liquid. Additionally, a computer (28) is utilized to control the basic functions of the stereolithographic functions.

The shutter blade is "electronically controlled" to turning the light in the bundle on and off, therefore the shutter blade is controlled by the computer. The shutter blade in conjunction with the fibers constitutes an electromechanical light valve. The computer comprises of control circuitry for controlling the elements of the stereolithographic apparatus. The lens tube acts as the micro lens for focusing the light source upon the material.

It would have been obvious to one of ordinary skill in the art to modify Fudim with a short arc lamp, control circuitry and micro lens as taught by Hull because it improved curing capabilities of the rapid prototyping apparatus with better response and intensity.

4. Claims 12, 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fudim in view of Berlin, as applied to claims 1, 2, 5, 7, 8, 10, 11 and 15-17, and further in view of Penn.

Fudim teaches the claimed apparatus as shown above.

Fudim fails to teach a modulator comprising of an LCD, PDLC, PLZT, FELCD or Kerr cell and multi-mode fibers.

Penn teaches a rapid prototyping apparatus having an imager comprising of an LCD or LED, lasers, digital micro-mirrors, and other image projectors. Fudim does teach something similar to LED displays for use in the apparatus.

The multi-mode fibers are interpreted by the examiner as fibers being capable of transmitting the light at different frequencies and intensities. Fiber optics are capable of transmitting the light depending on the light source and therefore are capable of being multi-mode.

It would have been obvious to one of ordinary skill in the art to modify Fudim with LCD as taught by Penn for use in the apparatus since it is an equivalent device as shown by Penn.

5. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fudim in view of Berlin and Hull as applied to claims 3, 4, 6, 9, 13 and 14, and further in view of Hagenau.

Fudim teaches the use of an array of miniature individually controlled mirrors that can be employed to modulate irradiation of individual fibers (Col. 4, lines 53-57).

Fudim fails to mention DMD.

Hagenau teaches that a DMD, is a digital micromirror device, and that a DMD array of micromirrors (46) is constructed on a semiconductor memory chip (Col. 7, lines 42-51). That the projection optics are selected to magnify the reflected image from the DMD (Col. 8, lines 1-3). The use of DMD's are widely known in the art and in fact, Fudim does teach DMD's in light of the teachings of Hagenau.

It would have been obvious to one of ordinary skill in the art to recognize that the array of miniature individually controlled mirrors taught by Fudim are DMD's as shown by Hagenau.

Response to Arguments

6. Applicant's arguments with respect to claims 1-22 have been considered but are moot in view of the new ground(s) of rejection. The new rejections address the amended claims concerning at least two light modulators. This was the main focus of the arguments by the applicants in the previous remarks. Berlin teaches the use of an array of light modulators and one of ordinary skill in the art would be aware of this feature in the light projection arts.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel S. Luk whose telephone number is (571) 272-1134. The examiner can normally be reached on Monday-Thursday 7 to 4 and alternate Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L. Walker can be reached on (703) 308-0457. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0651.

EL


W. L. WALKER
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700